TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT NO. 38109

I. INTRODUCTION

This Class II, synthetic minor air quality control operating permit is for the operation of a copper mine near Safford in Graham County, Arizona. The facility is owned and operated by Phelps Dodge Safford, Inc. The facility will have an anticipated maximum annual production of approximately 103 million tons of ore and development rock, and an anticipated total lifetime production of approximately 961 million tons.

Company Information

Facility Name:	Phelps Dodge Safford Mine
Facility Location:	32° 56'/109° 42', 3,600 ft
Mailing Address:	PO Box 151 Safford, Arizona, 85548

Background

This source is a copper mine, located approximately 8 miles north of Safford, Arizona. This is a new facility, consisting of two open-pit mines (Dos Pobres and San Juan), crushing and screening operations, heap leaching, and solution extraction/electrowinning (SX/EW).

II. PROCESS DESCRIPTION

A. Open-Pit Mining

Mining will commence at the Dos Pobres Mine, followed by the San Juan Mine several years later. Drilling and blasting will occur in both mines. Ore requiring crushing will be transported to the primary crusher. Ore suitable for immediate heap leaching will be delivered directly to the leach pad. Development rock will be transported to Development Rock Stockpiles.

B. Primary Crushing and Coarse Ore Stockpile

Haul trucks will deliver Run-of-Mine (ROM) to scalping grizzlies above the primary crusher. Undersize ore will pass through the grizzlies, while oversize material will be crushed to nominal minus 9 inch ore. Discharge from this operation will be sent to the coarse ore stockpile.

C. Secondary and Tertiary Crushing and Screening

Coarse ore is conveyed from the coarse ore stockpile to the secondary screens. Oversize ore is sent to the secondary crushers, which reduce rock size to nominal minus 1½ inch and sends it off to the tertiary crushing plant. Four tertiary screens discharge oversize material to the four tertiary crushers, which reduce the material to nominal minus ½ inch and discharges it to the fine ore product conveyor.

D. Agglomeration Process

The fine ore bin feed conveyor will feed the 6,800-ton fine ore surge bin, which will feed two agglomeration drums. A mixture of sulfuric acid and water will be added as a pre-treatment of the ore in the agglomeration drums, and then the material is to be transferred to the leach pad via conveyors.

E. Heap Leaching

Water with a low (approximately 6-10 g/l) concentration of sulfuric acid will be applied to the ore at the surface of the leach pad. The acid solution will leach through the ore to extract copper. The leach pad will be built such that the resulting pregnant leach solution (PLS) will flow downhill to the PLS collection system from where it will be routed to the solution extraction tanks located at the SX/EW plant.

F. Solution Extraction

The Safford Mine will incorporate an industry standard copper solution extraction (SX) plant to recover dissolved copper from electrolyte. The SX circuit will consist of a single train of three extraction settlers to transfer copper from the PLS to an organic solution, followed by a strip settler to transfer the copper from the organic solution to the electrolyte. Each mixer-settler will consist of a series of mixing tanks to allow about three minutes of residence time where the aqueous stream and the organic stream are intimately contacted to permit the transfer of metal and acid between phases. The resulting mixture of organic and aqueous will be fed into a settler tank where the two phases will separate. Due to a lower specific gravity, the organic phase will rise to the top of the settler and constitute the entire top layer.

Loaded organic solution, which will be rich in copper, will be pumped to the strip mixer-settler. Here, lean electrolyte, partially depleted in copper after electrowinning, will be used to remove copper from the organic. Hydrogen ions will be transferred into the organic to replace the extracted copper. The now barren organic will then advance to the extraction settlers as described above.

G. Electrowinning

Electrolyte that will have picked up copper in the SX process (rich electrolyte) will be routed to the electrowinning (EW) process for final processing. PDSI will build a conventional tankhouse to recover dissolved copper from the electrolyte. The EW tankhouse will be used for cathode production and will be capable of producing approximately 250 million pounds of copper per year.

Copper will be plated from the electrolyte onto cathode blanks by passing a DC current through the EW cells. The EW tankhouse design consists of 220 cells arranged in two parallel rows of 110 cells each. The cathode surfaces will be plated to 90 pounds after which they will be harvested by a crane. A stripping machine will remove the cathode copper from the stainless steel blanks, which will then be reused.

III. EMISSIONS

A. The material handling processes (crushing and screening, conveyors, etc.) emit particulate matter with a diameter of less than 10 microns (PM_{10}). PD Safford Mine has the potential to emit, after controls, 63.37 tons per year of PM_{10}.

B. Emissions of criteria pollutants are produced from the Emergency Generators and the Fire Water Pump Engine. These engines are limited to 375 hours of operation per year. Under this restriction, the engines have the potential to emit 2.24 tpy of CO and 52.87 tpy of NO_X.

C. Emissions of criteria pollutants are produced from the electrolyte heaters. These three units have the potential to emit 2.87 tpy of CO and 21.13 tpy of NO_X.

D. The SX/EW facility has fugitive emissions of 0.16 tpy of VOCs and 8.77 tpy of sulfuric acid mist.

E. The facility has a potential to emit 0.13 tpy of VOCs from diesel storage tanks.

Table 1 Facility Emissions

Pollutant	Facility Non-Fugitive Potential to Emit (tons/year)	Facility Fugitive Potential to Emit (tons/year)
PM_{10}	64.38	1,889
PM	64.38	543
NOX	74.00	232
CO	5.11	913
SO_2	1.11	27.25
VOC	2.28	0.16
H_2SO_4 Mist	0.00	8.77

IV. APPLICABLE REGULATIONS

The applicable regulations were identified by the agency as part of the application packet. If necessary, the source is required to list any additional regulations that may be applicable. Table 2 displays the applicable requirements for each piece of equipment under this proposed permit.

Table 2: Verification of Applicable Regulations

Unit	Date of Constr./Mod.	Control Device	Rule	Verification
Material Handling	N/A	Water spray, baghouses	AAC R18-2-721 and 702.B	PM limits for Crushing, Screening, and other material handling operations; 702.B contains opacity limits. NSPS Subpart LL does not apply because the equipment is not an "affected facility" as defined in 40 CFR §60.381
Fuel Burning Equipment	N/A	N/A	AAC R18-2-724	This standard applies to the electrolyte heaters
Internal Combustion Engines	N/A	N/A	AAC R18-2-719	This standard applies to all stationary rotating machinery
Petroleum Liquid Storage Tanks	N/A	N/A	AAC R18-2-710	This standard applies to the gasoline storage tanks.
Diesel Storage Tanks	N/A	N/A	AAC R18-2-730	General requirements for unclassified sources applies only to the 175,000 gallon tank.
Fugitive dust sources	N/A	Water and other reasonable precautions.	AAC R18, Article 6	These standards are applicable to all fugitive dust sources.
Mobile sources	N/A	Water Sprays/Water Truck for dust control	AAC R18, Article 8	Opacity requirements for smoke and dust for mobile sources (construction equipment, etc.).

V. MONITORING AND RECORDKEEPING REQUIREMENTS

A. Material Handling

The Permittee is required to establish baseline opacity for all material handling emission points, and to conduct Method 9 observations every two weeks. The Permittee is required to keep records of all Method 9 observations and results. The Permittee is also required to keep records of daily process rates and hours of operation.

B. Solvent Extraction/Electrowinning

The Permittee is required to keep records of all emission control techniques employed in the SX/EW process.

C. Opacity Requirements

The permit specifies opacity limitations for the various emission sources found within the facility. In addition to the Method 9 observations required above, the permit requires the source to perform bi-weekly observations of the various point source and non-point source emissions plumes, and if a plume appears to exceed the opacity standard, a Method 9 observation is to be conducted.

The Permittee is to keep records of the date, time, and results of any Method 9 observation made, as well as the name of the observer who conducted the test.

D. Particulate Matter Requirements

The permit specifies particulate matter limits for the fuel-burning equipment and fugitive dust sources. The Permittee is required to keep records of all activities that may produce fugitive dust emissions of particulate matter.

E. Internal Combustion Engines

The Permittee is required to keep records of opacity and particulate matter as discussed above. The Permittee is also required to keep records to demonstrate compliance with the sulfur dioxide standard.

F. Gasoline Storage and Dispensing

The Permittee is required to keep records of product transfer documents for gasoline transferred into the gasoline storage tanks.

G. Diesel Storage Tanks

The Permittee is required to keep records of dimensions and capacities for each of the diesel fuel storage tanks.

VI. Insignificant Activities

Table 3, below, lists the insignificant activities at the Phelps Dodge Safford Mine.

Table 3: Insignificant Activities

Equipment Description	Number of Equipment Items	Maximum Size or Capacity	Verification of Insignificance
Pressurized Liquid Propane Tanks	3	15,000 gallons each	Pressurized storage vessels are exempt from A.A.C. R18-2-710 requirements
Extraction Reagent Storage Tanks	2	15,000 gallons each	Vapor pressure < diesel fuel, and tank capacity smaller than insignificant threshold for diesel tanks (A.A.C. R18-2-101.57.c)
Diluent Storage Tank	1	10,000 gallons	Vapor pressure far less than diesel fuel, and tank capacity smaller than insignificant threshold for diesel tanks (A.A.C. R18-2-101.57.c)
Anti-freeze Storage Tanks	2	15,000 and 8,500 gallons	Vapor pressure < diesel fuel, and tank capacity smaller than insignificant threshold for diesel tanks (A.A.C. R18-2-101.57.c)
Diesel Storage Tanks	3	5,000, 10,000 and 25,000 gallons	Size limitation for Diesel Fuel Storage Tanks (A.A.C. R18-2-101.57.c

VII. Ambient Air Impact Analysis

Phelps Dodge Safford conducted an Ambient Air Impact Analysis to demonstrate protection of the National Ambient Air Quality Standards (NAAQS) and the Arizona Ambient Air Quality Guidelines (AAAQG). The highest predicted impact for criteria pollutants is from PM_{10}, with a predicted concentration that is 28% of the NAAQS annual limit. The largest impact of AAAQG pollutants is from chromium, with a 1-hour concentration that is 3.45% of the AAAQG threshold. The predicted maximum concentrations of all modeled pollutants from the facility are not expected to exceed the NAAQS or AAAQG thresholds.